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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Kaz et al.

Application No.: **10/087,448**

Filed: **March 1, 2002**

For: **PROCESS FOR THE PRODUCTION OF A MULTI-LAYER ELECTRODE OR ELECTRODE ASSEMBLY AND GASEOUS DIFFUSION ELECTRODE**

BOX MISSING PARTS
Commissioner for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to BOX MISSING PARTS, Commissioner for Patents, Washington, D.C. 20231 on June 12, 2002.

By: Carol Prentice
Carol Prentice

PRELIMINARY AMENDMENT

Dear Sir:

Prior to the calculation of the filing fee and examination of the above-referenced U.S. patent application, please amend the application as follows:

IN THE CLAIMS:

Cancel claims 1-46 and substitute the following new claims 47-92 therefor:

--47. Process for the production of a multi-layer electrode or electrode assembly, wherein a first layer is rolled onto a carrier and at least one additional function layer is produced by spraying on a powder.

48. Process as defined in claim 47, wherein the powder is sprayed on dry.

49. Process as defined in claim 47, wherein the roller application is brought about by means of one or more heated rollers.

50. Process as defined in claim 47, wherein the carrier is designed as a carrier mesh.

51. Process as defined in claim 47, wherein the carrier is produced from a metallically conductive material.

52. Process as defined in claim 47, wherein the carrier is produced from high-grade steel.

53. Process as defined in claim 47, wherein the carrier is produced from silver-plated nickel.

54. Process as defined in claim 47, wherein the carrier is produced from titanium.

55. Process as defined in claim 47, wherein the carrier comprises an electrically non-conductive material, a conductive contact layer being or having been applied to said material.

56. Process as defined in claim 47, wherein a sprayed-on function layer is a reaction layer.

57. Process as defined in claim 56, wherein a reaction layer is produced by spraying on a catalyst carrier material on a carbon basis.

58. Process as defined in claim 57, wherein platinum is used as catalyst material.

59. Process as defined in claim 47, wherein a sprayed-on function layer is a barrier layer.

60. Process as defined in claim 59, wherein a mixture of carbon and a hydrophobing material is used for forming a barrier layer.

61. Process as defined in claim 60, wherein PTFE is used as hydrophobing material.

62. Process as defined in claim 59, wherein the barrier layer has a surface density in the range of between 0.3 mg/cm^2 and 1 mg/cm^2.

63. Process as defined in claim 47, wherein a carrier structure is produced by rolling carbon powder onto a carrier.

64. Process as defined in claim 63, wherein the carbon powder is rolled on mixed with a binding agent.

65. Process as defined in claim 64, wherein a hydrophobing material is used as binding agent.

66. Process as defined in claim 64, wherein PTFE is used as binding agent.

67. Process as defined in claim 63, wherein a pore-forming agent is added to the material to be rolled on.

68. Process as defined in claim 63, wherein the composition of the material to be rolled on and/or the particle size therein and/or a contact pressure during the roller application is adjusted.

69. Process as defined in claim 63, wherein the carrier structure is connected to a membrane.

70. Process as defined in claim 69, wherein a function layer is sprayed onto the carrier structure and/or onto the membrane prior to their connection.

71. Process as defined in claim 70, wherein prior to the connection between carrier structure and membrane a function layer is sprayed onto a connecting side of the membrane and an oppositely located side.

72. Process as defined in claim 71, wherein the respective spraying on is carried out simultaneously.

73. Process as defined in claim 70, wherein the function layer is a reaction layer.

74. Process as defined in claim 70, wherein the connection between carrier structure and membrane is brought about by roller application.

75. Process as defined in claim 69, wherein an additional carrier structure is connected to the carrier structure-membrane connection.

76. Process as defined in claim 75, wherein the additional carrier structure is rolled on.

77. Process as defined in claim 75, wherein the additional carrier structure is built up essentially in the same way as the carrier structure first connected to the membrane.

78. Process as defined in claim 75, wherein the additional carrier structure is produced essentially in the same way as the carrier structure first connected to the membrane.

79. Process as defined in claim 69, wherein an electrode-membrane unit for a fuel cell is formed.

80. Process as defined in claim 47, wherein the first layer is a rolled-on reaction layer.

81. Process as defined in claim 80, wherein a barrier layer is sprayed onto the rolled-on reaction layer.

82. Process as defined in claim 80, wherein a contact layer is sprayed onto an electrically non-conductive carrier.

83. Process as defined in claim 82, wherein essentially the same material as for the barrier layer is used for the contact layer.

84. Process as defined in claim 81, wherein the barrier layer and the contact layer are sprayed on at the same time.

85. Process as defined in claim 80, wherein a membrane is arranged on an outer function layer.

86. Fuel cell electrode assembly produced according to the process comprising:
producing a carrier structure by rolling carbon powder onto a carrier, said carrier being connected to a membrane;
and producing at least one additional function layer by spraying on a powder.

87. Gaseous diffusion electrode produced according to the process comprising:
rolling a first layer onto a carrier and producing at least one additional functional layer by spraying on a powder.

88. Oxygen-consuming electrode produced according to the process comprising:
rolling a first layer onto a carrier and producing at least one additional functional layer by spraying on a powder.

89. Electrode having a catalytically active reaction layer, wherein a barrier layer produced by means of a sprayed on powder is arranged on the reaction layer.

90. Electrode as defined in claim 89, wherein the barrier layer is formed by a mixture of carbon and a hydrophobing material.

91. Electrode as defined in claim 90, wherein the hydrophobing material is PTFE.

92. Electrode as defined in claim 89, wherein the barrier layer has a surface density in the range of between 0.4 mg/cm^2 and 0.8 mg/cm^2. --

REMARKS:

This Preliminary Amendment amends the claims to remove the multiple claim dependencies. The new claims are also believed to be in better form for U.S. examination.

Entry of this Amendment prior to calculation of the filing fee is respectfully requested.

Respectfully submitted,

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